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NAVFAC **IGS-05500 (MAY 2002)**

Preparing Activity: LANTNAVFACENGCOM **Based on UFGS-05500N**

ITALIAN GUIDE SPECIFICATIONS

Use for ITALIAN projects only
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SECTION 05500

METAL FABRICATIONS
05/02

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NOTE: This guide specification is issued by the Atlantic Division, Naval Facilities Engineering Command for regional use in Italy.
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NOTE: This guide specification covers requirements for miscellaneous metalwork. Units of work normally included in this section should be metal items which require specific fabrication to meet the desired project requirements. The Key Word Index of the CSI "Masterformat" should be consulted for the proper location of most items. Loose items fabricated from structural shapes and not directly attached to major structural steel items may be included in this section, especially when a structural steel section is not included.
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NOTE: The following information shall be shown on the drawings:

1. Location and configuration of all metalwork.

2. All sizes and dimensions.

3. Special fastenings, attachments or anchoring.

4. Location and size of expansion shields larger than 10 mm 3/8 inch in diameter.

5. Location of products to be galvanized.

6. Location and special details of expansion joint covers.

7. Connection details, other than manufacturer's

standard, of grating.

8. Locate and detail removable sections of handrails.

9. Location and support detail of ladders.

10. Location and details of all structural steel door frames.

11. Absent many of the standards available to specifiers in the U.S., quality control of custom, shop-built items are difficult to define and enforce. Europe has many fine metal craftsman, however, without the uniform standards defining the fabrication requirements, the level of quality may be random. Factory fabricated components are generally of a more predictable quality than shop fabricated and will require less effort during the submittal process.

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Comments and suggestion on this specification are welcome and should be directed to the technical proponent of the specification. A listing of the technical proponents, including their organization designation and telephone number, is on the Internet.

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.

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PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

EUROPEAN COMMITTEE FOR STANDARDIZATION (EN)

EN 131/1	(1993) Ladders - Terms, Types, Functional Sizes
EN 287/1	(1992) Approval Testing of Welders - Fusion Welding - Part 1, Steels
EN 288/1	(1992) Specification and Qualification of

	Welding Procedures for Metallic Materials - Part 1, General Rules for Fusion Welding
EN 288/2	(1992) Specification and Qualification of Welding Procedures for Metallic Materials - Part 2, Welding Procedures Specification for Arc Welding
EN 288/3	(1992) Specification and Qualification of Welding Procedures for Metallic Materials - Part 3, Welding Procedure Tests for the Arc Welding of Steels
EN 288/4	(1992) Specification and Qualification of Welding Procedures for Metallic Materials - Part 4, Welding Procedure Tests for the Arc Welding of Aluminum and its Alloys
EN 288/5	(1992) Specification and Qualification of Welding Procedures for Metallic Materials - Part 5, Approval by Using Approved Welding Consumables for Arc Welding
EN 288/6	(1992) Specification and Qualification of Welding Procedures for Metallic Materials - Part 6, Approval Related to Previous Experience
EN 288/7	(1992) Specification and Qualification of Welding Procedures for Metallic Materials - Part 7, Approval by a Standard of Welding Procedures for Arc Welding
EN 485/1	(1993) Aluminum and Aluminum Alloys - Sheet, Strip and Plate - Part 1: Technical Conditions for Inspection and Delivery
EN 485/2	(1994) Aluminum and Aluminum Alloys - Sheet, Strip and Plate - Part 2: Mechanical Properties
EN 485/3	(1993) Aluminum and Aluminum Alloys - Sheet, Strip and Plate - Part 3: Tolerances for Shape and Dimensions for Hot Rolled Products
EN 485/4	(1993) Aluminum and Aluminum Alloys - Sheet, Strip and Plate - Part 4: Tolerances for Shape and Dimensions for Cold Rolled Products
EN 604/1	(1997) Aluminum and Aluminum Alloys - Cast Forging Stock - Part 1: Technical Conditions for Inspection and Delivery

EN 604/2	(1997) Aluminum and Aluminum Alloys - Cast Forging Stock, Part 2, Tolerances on Dimensions and Form
EN 755/3	(1995) Aluminum and Aluminum Alloys - Extruded Rod/Bar, Tube and Profiles, Part 3, Round Bars, Tolerances on Dimensions and Form
EN 755/4	(1995) Aluminum and Aluminum Alloys - Extruded Rod/Bar, Tube and Profiles, Part 4, Square Bars, Tolerances on Dimensions and Form
EN 755/5	(1995) Aluminum and Aluminum Alloys - Extruded Rod/Bar, Tube and Profiles, Part 5, Rectangular Bars, Tolerances on Dimensions and Form
EN ISO 1430	(1994) Metallic Coatings - Hot Dip Galvanized Coatings on Ferrous Materials - Gravimetric Determination of the Mass per Unit Area
EN ISO 8503/1	(1995) Preparation of Steel Substrates Before Application of Paints and Related Products - Surface roughness Characteristics of Blast Cleaned Steel Substrates - Part 1: Specifications and Definitions for ISO Surface Profile Comparator for the Assessment of Abrasive Blast-Cleaned Surfaces
EN ISO 1481	(1994) Slotted Pan Head Tapping Screws (ISO 1481:1983
EN 10113/1	(1993) Hot Rolled Products in Weldable Fine Grain Structural Steels, Part 1, General Delivery Conditions
EN 10113/2	(1993) Hot Rolled Products in Weldable Fine Grain Structural Steels, Part 2, Delivery Conditions for Normalized/Normalized Rolled Steels
EN 10113/3	(1993) Hot Rolled Products in Weldable Fine Grain Structural Steels - Part 3: Delivery Conditions for Rolled Steels
EN 10142	(1990) Continuously Hot Dip Zinc Coated Low Carbon Steel Sheet and Strip for Cold Forming - Technical Delivery Conditions, Including Amendment 1, (1995)

EN 10025	(1993) Hot Rolled Products of Non-Alloy Structural Steels - Technical Delivery Conditions
EN 10143	(1993) Continuously Hot Dip Metal Coated Steel Sheet and Strip - Tolerances on Dimensions and Shape
EN 10147	(1991) Continuously Hot Dip Zinc Coated Structural Steel Sheet and Strip - Technical Delivery Conditions, Including Amendment 1 (1995).
EN 10220	(1993) Seamless and Welded Steel Tubes - Dimensions and Masses per Unit Length
EN 20898/1	(1991) Mechanical Properties of Fasteners - Part 1: Bolts, Screws and Studs
ENV 1993-1-1	(1992) Eurocode 3: Design of Steel Structures - Part 1-1: General Rules and Rules for Buildings
ENV 1993-1-2	(1995) Eurocode 3: Design of Steel Structures - Part 1-2: General Rules - Structural Fire Design
ENV 1993-1-3	(1996) Eurocode 3: Design of Steel Structures - Part 1-3: General Rules for Cold Formed Thin Gauge Members and Sheeting
ENV 1993-1-4	(1996) Eurocode 3: Design of Steel Structures - Part 1-4: General Rules - Supplementary Rules for Stainless Steels
ENV 1998-1-1	(1994) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part 1-1: General Rules - Seismic Actions and General Requirements for Structures
ENV 1998-1-2	(1994) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part 1-2: General Rules - General Rules for Buildings
ENV 1998-1-3	(1995) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part 1-3: General Rules - Specific Rules for Various Materials and Elements
ENV 1998-1-4	(1996) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part

	1-4: General Rules - Strengthening and Repair of Buildings
ENV 1998-2	(1994) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part 2: Bridges
ENV 1998-3	(1996) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part 3: Towers, Masts and Chimneys
ENV 1998-5	(1994) Eurocode 8: Design Provisions for Earthquake Resistance of Structures - Part 5: Foundations, Retaining Structures and Geotechnical Aspects

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NOTE: EC countries are in the process of adopting the Eurocode and rescinding their previous laws pertaining to the design of buildings. The designer is advised to consult with local in-country consultants as to the current status of this transition and edit the following accordingly.
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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 185	(1988) Grey Cast Iron - Classification
ISO 887	(1983) Plain Washers For Metric Bolts, Screws and Nuts - General Plan
ISO 4014	(1988) Hexagon Head Bolts - Products Grades A and B
ISO 4017	Hexagon Head Screws - Product Grade A and B
ISO 4018	Hexagon Head Screws - Produce Grade C
ISO 7089	(1983) Plain Washers - Normal Series - Produce A

1.2 SUBMITTALS

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NOTE: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item is required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some

submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Recommended codes for Army projects are "RE" for Resident Engineer approval, "ED" for Engineering approval, and "AE" for Architect-Engineer approval. Codes following the "G" typically are not used for Navy projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Submit the following in accordance with section entitled "Submittal Procedures."

SD-02 Shop Drawings

Fabrication drawings of steel stairs; G

Fabrication drawings of structural steel door frames; G

Access doors and panels, installation drawings; G

Cover plates and frames, installation drawings; G

Expansion joint covers, installation drawings; G

Floor gratings and roof walkways, installation drawings; G

Handrails, installation drawings; G

Ladders, installation drawings; G

Wheel guards, installation drawings; G

Window guards, installation drawings; G

Ship's ladder (with or without guards), installation drawings; G

Embedded angles and plates, installation drawings; G

Roof hatch; G

Submit fabrication drawings showing layout(s), connections to structural system, and anchoring details as specified.

Submit templates, erection and installation drawings indicating thickness, type, grade, class of metal, and dimensions. Show construction details, reinforcement, anchorage, and installation with relation to the building construction.

SD-03 Product Data

Access doors and panels

Cover plates and frames

Control-joint covers

Expansion joint covers

Floor gratings and roof walkways

Handrails

Ladders

Steel stairs

Steel Stairs, circular

Structural steel door frames

Wheel guards

Window guards

Ship's ladder (with or without guards)

Roof hatch

1.2.3 SD-04 Samples

a. Expansion joint covers

b. Control-joint covers

Submit certificates from an independent testing agency indicating that welders are certified for the types of welds and materials required.

Samples may be installed in the work, provided each sample is clearly identified and its location recorded.

1.3 QUALIFICATION OF WELDERS

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NOTE: For jobs in Iceland, in lieu of certified

welders and inspectors, use "Technological Institute of Iceland" certified welders and inspectors.

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Qualify welders in accordance with EN 287/1. Use procedures, materials, and equipment of the type required for the work.

1.4 DELIVERY, STORAGE, AND PROTECTION

Protect from corrosion, deformation, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

PART 2 PRODUCTS

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NOTE: Product selections should be based on esthetic values, reliability and cost. Delete alternate requirements where they occur.

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2.1 MATERIALS

2.1.1 Structural Carbon Steel

EN 10025.

2.1.2 Structural Tubing

EN 10220 Group 1

2.1.3 Gratings

a. Gray cast iron ISO 185 Grade 300.

2.1.7 Anchor Bolts

ISO 4014. Where exposed, shall be of the same material, color, and finish as the metal to which applied.

2.1.7.1 Threaded Inserts Expansion Anchors

Provide inserts recessed not less than [65] [_____] mm into concrete or masonry. Pullout [_____] kg in concrete f'c = 20 MPa.

2.1.7.2 Lag Screws and Bolts

ISO 4017 and ISO 4018, type and grade best suited for the purpose.

2.1.7.4 Bolts and Studs

EN 20898/1, Class 4.8.

2.1.7.6 Screws

Provide hexagon head screws to conform to ISO 4017, Grade A. Slotted

panhead tapping screws EN ISO 1481 slotted raised.

2.1.4.5 Washers

Provide plain washers to conform to ISO 887 and ISO 7089 and Grade A. Provide comparable lock washers.

2.1.8 Aluminum Alloy Products

Conform to [EN 485/1, EN 485/2, EN 485/3, EN 485/4] [for sheet plate], [EN 755/3, EN 755/4, EN 755/5 for extrusions] [and EN 604/1, EN 604/2 for castings], as applicable. Provide [aluminum extrusions at least 3 mm 1/8 inchthick] [and aluminum plate or sheet at least 1.3 mm 0.050 inch thick.]

2.2 FABRICATION FINISHES

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NOTE: The Material Safety Data Sheets (MSDS) for coating materials shall show exclusion or replacement of the following materials as intended ingredients: asbestos, benzene, chromium compounds, coal tar, 2-ethoxyethanol and 2-methoxyethanol and their acetates, halogenated hydrocarbons, and lead compounds. The content of volatile organic compounds (VOC), and marking, shall be in compliance with air quality regulations for the type of application and jurisdiction where used.
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2.2.1 Galvanizing

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NOTE: Specify galvanizing for items installed in exterior exposures subject to salt spray or corrosive fumes and interior areas subject to continual wetting or high humidity.
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Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: EN 10142 minimum coating designation Z275, EN 10143 or EN 10147, as applicable.

2.2.2 Galvanize

Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.

2.2.3 Repair of Zinc-Coated Surfaces

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NOTE: Delete this paragraph when no galvanized items are specified.
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Repair damaged surfaces with galvanizing repair method and paint or by application of stick or thick paste material specifically designed for repair of galvanizing, as approved by Contracting Officer. Clean areas to be repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread molten material uniformly over surfaces to be coated and wipe off excess material.

2.2.4 Shop Cleaning and Painting

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NOTE: Shop painting herein is for structural steel protected from the weather and not subjected to corrosive environments. For steel which will be exposed to the weather or corrosive environments, modify the shop painting accordingly.
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2.2.4.1 Surface Preparation

Blast clean surfaces in accordance with EN ISO 8503/1 surfaces that will be exposed in spaces above ceiling or in attic spaces, crawl spaces, furred spaces, and chases may be cleaned in accordance with in lieu of being blast cleaned. Wash cleaned surfaces which become contaminated with rust, dirt, oil, grease, or other contaminants with solvents until thoroughly clean. Steel to be embedded in concrete shall be free of dirt and grease. Do not paint or galvanize bearing surfaces, including contact surfaces within slip critical joints, but coat with rust preventative applied in the shop.

2.2.4.2 Pretreatment, Priming and Painting

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NOTE: Use manufacturers standard treatment when painting and finishing is required.
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Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. [On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of 0.03 mm 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.]

2.2.5 Nonferrous Metal Surfaces

Protect by plating, anodic, or organic coatings.

2.2.6 Aluminum Surfaces

2.2.6.1 Surface Condition

Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

2.2.6.2 Unexposed Sheet, Plate, and Extrusions

Unexposed sheet, plate and extrusions may have mill finish as fabricated. Sandblast castings' finish, medium.

2.3 ACCESS DOORS AND PANELS

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NOTE: Access doors and panels in fire-rated walls and ceilings must be of equivalent fire ratings. Coordinate the location of access doors and panels with the mechanical drawings and specifications.
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Provide flush type access doors and panels. Fabricate frames for access doors of steel not lighter than 1.9 mm 14 gage with welded joints and anchorage for securing into construction. Provide access doors with a minimum of 350 by 500 mm 14 by 20 inches and of not lighter than 1.9 mm 14 gage steel, with stiffened edges and welded attachments. Provide access doors hinged to frame and with a flush-face, turn-screw-operated latch. [Provide exposed metal surfaces with a galvanized finish.] [Provide exposed metal surface with a baked enamel finish.] [Provide exposed metal surfaces with a shop applied prime coat.] [Access panels for suspended plaster ceilings and plastered walls are specified in Section 09205, "Furring and Lathing."]

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NOTE: For BEQ projects which have terminal air blenders, add the bracketed item.
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[Provide ceiling access panels for terminal air blenders as indicated. Provide pin-tumbler cylinder locks with appropriate cams in lieu of screwdriver-operated latches.]

2.4 CONTROL-JOINT COVERS

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NOTE: Use control-joint covers only when necessary to meet specific job requirements such as elimination of cracks which would be difficult to clean.
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Provide control-joint covers to be located on wall surfaces of concrete, masonry and tile work. Provide protective coating on the surface in contact with concrete, masonry or tile.

2.5 CORNER GUARDS AND SHIELDS

Jambs and sills of openings and edges of platforms shall be steel shapes and plates anchored in masonry or concrete with welded steel straps or end-weld stud anchors.

2.6 COVER PLATES AND FRAMES

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NOTE: Insert required live load value in the blank space. Select requirements for floor plate removal method.

****

Fabricate cover plates of [6] [_____] mm [1/4] [_____] inch thick rolled steel weighing not more than 45 kg 100 pounds per plate with a selected raised pattern nonslip top surface. Plate shall be [galvanized] [shop painted]. Reinforce to sustain a live load of [_____] MPa[_____] pounds per square foot. Frames shall be structural steel shapes and plates, [with bent steel bars or headed anchors welded to frame for anchoring to concrete] [securely fastened to the structure as indicated]. Miter and weld all corners. Butt joint straight runs. Allow for expansion on straight runs over 4500 mm 15 feet. [Provide holes for lifting tools.] [Provide flush drop handles for removal formed from 6 mm 1/4 inch round stock where indicated.] [Provide holes and openings with 13 mm 1/2 inch clearance for pipes and equipment.] Remove sharp edges and burrs from cover plates and exposed edges of frames. Weld all connections and grind top surface smooth. Weld bar stops every six inches. Provide 3 mm 1/8 inch clearance at edges and between cover plates.

2.7 EXPANSION JOINT COVERS

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NOTE: Design floor expansion joint covers so that top of cover plate is flush with adjoining finished floor surfaces. Use plain-surface floor plate on interior finished floors and abrasive-surface floor plate on exposed concrete interior floors and exterior applications. Covers may be of steel if deemed adequate for serviceability, and the paragraph modified accordingly. Detail expansion joints on the drawings. The expansion joint must have the same fire rating as the floor.

****

Provide expansion joint covers constructed of extruded aluminum with anodized satin aluminum finish for walls and ceilings and with standard mill finish for floor covers and exterior covers. Furnish plates, backup angles, expansion filler strip and anchors as indicated. [Expansion joint system shall provide an RE-1 rating of [____].

2.8 EXTRUDED FLOOR MAT FRAMES

Provide recess frames for rubber or coco mats of extruded 6063-T5 aluminum, in sizes shown. Miter corners to ensure accurate fitting. Determine depth of recess by the mat thickness. Anchor frames in concrete with anchor pins or bolts.

2.9 FLOOR GRATINGS AND ROOF WALKWAYS

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NOTE: Insert required live load value in the blank space.
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NOTE: Gratings for treads and landings should be considered for maintenance walkways, anti-skid platforms, maintenance and inspection walkways, mezzanine flooring, rooftop walkways, storage areas, catwalks and staging platforms. Grating tread type has openings thru the surface; consider footwear worn by personnel using these facilities. Select frame anchorage for the applicable installation. Where banding is required to be load bearing, drawings must detail the welding of banding to bearing bars.
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Design [steel] [aluminum] grating in accordance with manufacturer's charts for plank grating. [Galvanize steel floor gratings.]

a. Design floor gratings to support a stress live loadof [_____] MPa [_____] pounds per square foot for the spans indicated, with maximum deflection of L/240.

b. [Band edges of grating with bars of the same size as the bearing bars. Weld banding in accordance with the manufacturer's standard for trim [unless otherwise indicated]. Design tops of bearing bars, cross or intermediate bars to be in the same plane and match grating finish.]

--or--

b. Band ends of gratings with bars of the same or greater thickness than the metal used for grating. Weld banding bars to the bearing bars or channels at least every fourth bar or channel and in every corner. Tack weld intervening bars or channels. Band diagonal or round cuts by welding bars of the same or greater thickness metal used for grating in accordance with the manufacturer's standard for trim [unless otherwise indicated].]

c. [Attach gratings to structural members with welded-on anchors.] [Anchor gratings to structural members with bolts, toggle bolts, or expansion shields and bolts.] [Attach grating as per manufacturer's roof attachment system.]

d. Slip resistance requirements.

[e. Rooftop walkway: Minimum 600 mm 2 feet wide, 1.8 mm14 gage, EN 10113/1, EN 10113/2, EN 10113/3 Z275 G-90, steel with slip resistant surface. Furnish all brackets, connectors and other accessories. Support at minimum 1500 mm 5 foot intervals on hard rubber pads in accordance with manufacturers instructions.]

2.10 GAS-TIGHT MANHOLE COVER AND FRAME

Provide a heavy duty type made of ductile cast-iron with bolted lid, machined bearing surfaces and gasket grooves, continuous neoprene gasket, counter sunk bronze hex head cap screws, and concealed watertight pickholes. Provide frame with a 760 mm 30 inch diameter clear opening. Maximum weight of frame and cover together to be 240 kg 530 pounds.

2.11 GUARD POSTS (BOLLARDS)

Provide [_____] mm [_____] inch [galvanized] [prime coated] [standard] [extra strong] weight steel pipe as specified in EN 10220, Group 1. Anchor posts in concrete [as indicated] and fill solidly with concrete with minimum compressive strength of 17 MPa 2500 psi.

2.12 HANDRAILS

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NOTE: Handrail design must meet loads of the applicable building code. Decorative architectural handrail is not covered in this section. See NAAMM, "Pipe Railing Manual" for suggestions.

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Design handrails to resist a concentrated load of [490 N] [250 lbs] [_____] in any direction at any point of the top of the rail or [290 N/m] [20 lbs per foot] [_____] applied horizontally to top of the rail, whichever is more severe. Provide the same size rail and post. Provide pipe collars of the same material and finish as the handrail and posts. [Provide series 300 stainless steel pipe collars.]

2.12.1 Steel Handrails, Including Carbon Steel Inserts

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NOTE: Standard steel pipe at nominal diameter 30 mm 1 1/4 inches meets the minimum requirements since the outside diameter is 45 mm 1.66 inches.

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Provide steel handrails, including inserts in concrete, [steel pipe conforming to EN 10220 Group 1] [or] [structural tubing conforming to, Grade A or B of equivalent strength]. Provide steel railings of [40] [50] mm [1 1/2] [2] inches nominal size. [Railings to be hot-dip galvanized] [and] [shop painted].]

a. Fabrication: Joint posts, rail, and corners by one of the following methods:

(1) Flush-type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 10 mm3/8 inch hexagonal-recessed-head setscrews.

(2) Mitered and welded joints made by fitting post to top rail

and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Butt railing splices and reinforce them by a tight fitting interior sleeve not less than 150 mm 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed.

b. [Provide removable sections as indicated.]

2.12.2 Aluminum Handrails

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NOTE: Do not use slip-on type fittings and set screws for locations subject to abusive use by building occupants. The less expensive Alloy 6061-T6 meets the strength requirements, but is not suitable for bending, and discolors when anodized. Handrail fastenings should be of Series 300 stainless steel. Specify No. 316 for marine environments.
****

Consists of [[40] [50] mm [1 1/2] [2] inchEN 755/3, EN 755/4], EN 755/5, [45 mm 1 3/4 inch square aluminum semi-hollow tube with rounded corners. Railings shall be [mill finish] [anodized] aluminum [_____ color]. All fasteners shall be Grade B.5 stainless steel.

a. Fabrication: Provide jointing by one of the following methods:

(1) Flush-type rail fittings, welded and ground smooth with splice locks secured with 10 mm 3/8 inch recessed head set screws.

(2) Mitered and welded joints made by fitting post to top rail, intermediate rail to post, and corners, shall be groove welded and ground smooth. Splices, where allowed by the Contracting Officer , shall be butted and reinforced by a tight fitting dowel or sleeve not less than 150 mm 6 inches in length. Tack weld or epoxy cement dowel or sleeve to one side of the splice.

(3) Assemble railings using slip-on aluminum-magnesium alloy fittings for joints. Fasten fittings to pipe or tube with 6 or 10 mm 1/4 or 3/8 inch stainless steel recessed head setscrews. Provide assembled railings with fittings only at vertical supports or at rail terminations attached to walls. Provide expansion joints at the midpoint of panels. Provide a setscrew in only one side of the slip-on sleeve.

b. [Removable railing sections: Provide removable railing sections as indicated. [Provide toe-boards and brackets where indicated, using flange castings as appropriate.]]

2.13 LADDERS

Fabricate vertical ladders conforming to EN 131/1. Use 65 by 10 mm 2 1/2 by 3/8 inch steel flats for stringers and 20 mm 3/4 inchdiameter steel rods for rungs. Rungs to be not less than 400 mm 16 incheswide, spaced 300 mm apart, plug welded or shouldered and headed into stringers. Install ladders so that the distance from the rungs to the finished wall surface will not be less than 175 mm7 inches. Provide heavy clip angles welded or bolted to the stringer and drilled [for not less than two 12 mm 1/2 inch diameter expansion bolts] as indicated. Provide intermediate clip angles not over 1200 mm48 inches on centers. [For installation exposed to the weather, provide exposed metal surfaces with a galvanized finish.]

2.13.1 Ladder Cages

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NOTE: Delete this paragraph when the length of climb is 6000 mm 20 feet or less.
****

Fabricate 50 by 6 mm 2 by 1/4 inchhorizontal bands and 40 by 5 mm 1 1/2 by 3/16 inch vertical bars. Provide attachments for fastening bands to the side rails of ladders or directly to the structure. Provide and fasten vertical bars on the inside of the horizontal bands. Extend cages not less than 690 mm 27 inches or more than 710 mm 28 inches from the centerline of the rungs, excluding the flare at the bottom of the cage, and not less than 690 mm 27 inches in width. Clear the inside of the cage of projections.

2.13.2 Ship's Ladder

Fabricate stringers and framing of steel plate or shapes. Bolt, rivet or weld connections and anchor to supporting construction. Provide treads with non-slip surface as specified for safety treads. [Aluminum ladders may be provided, subject to approval of treads, materials, and shop drawings. Requirements shown or specified for steel apply. Provide anchor items of zinc-coated steel.] Design assembly, including tread connections and methods of attachment, to support a concentrated live load of 1300 N 300 pounds per tread. Provide railings as specified for metal handrails.

2.14 MISCELLANEOUS PLATES AND SHAPES

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NOTE: Indicate construction details on the drawings for clarification of the type and the arrangement of miscellaneous metal.
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Provide for items that do not form a part of the structural steel framework, such as lintels, sill angles, [support framing for ceiling-mounted toilet partitions,] miscellaneous mountings and frames. Provide lintels fabricated from structural steel shapes over openings in masonry walls and partitions [as indicated and] as required to support wall loads over openings. Provide with connections and [fasteners] [welds]. Construct to have at least 200 mm 8 inches bearing on masonry at each end.

Provide angles and plates, EN 10113/1, EN 10113/2, EN 10113/3 for embedment

as indicated. Galvanize embedded items exposed to the elements according to EN ISO 1430.

2.15 SAFETY CHAINS [AND GUARDRAILS]

Construct safety chains of galvanized steel, straight link type, 5 mm3/16 inch diameter, with at least twelve links per 300 mm foot, and with snap hooks on each end. Provide snap hooks of boat type. Provide galvanized 10 mm 3/8 inch bolt with 20 mm 3/4 inch eye diameter for attachment of chain, anchored as indicated. Supply two chains, 100 mm 4 inches longer than the anchorage spacing, for each guarded area. [Corrugated sheet steel beam guardrail as indicated on the drawings. Provide bolts and nuts as indicated.] Locate [guard rails] safety chain where indicated. Mount the top chain [rail] 1050 mm 3 feet 6 inches[_____] above the [floor] [ground] and mount the lower chain [rail] 600 mm 2 feet [_____] above the [floor] [ground].

2.16 SAFETY NOSINGS FOR CONCRETE TREADS

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NOTE: Cast iron nosings may be specified where heavy use is anticipated. They should not be used where appearance is important since they tend to discolor or rust. Check for availability. Cast aluminum nosings may cost more than cast iron nosings, but may be more available. Specify where appearance is important.

****

[Provide safety nosings of [cast aluminum] [cast iron] with [cross-hatched] [plain] abrasive-surfaces, or extruded aluminum with abrasive inserts. Nosing to be at least 100 mm 4 inches wide and 6 mm 1/4 inch thick [and terminating at not more than 150 mm 6 inches from the ends of treads] [for metal-pan cement-filled treads extending the full length of the tread] for stairs and [as indicated] for platforms and landings. Provide safety nosings with anchors embedded in the concrete and with tops flush with the top of the traffic surface.]

2.17 SAFETY TREADS

****

NOTE: Tread type must be selected and indicated. Delete remaining tread types.

NAAMM BG:

W - welded (steel)
P - pressure locked (steel or aluminum)
R - riveted (steel or aluminum)

B   bolted (steel or aluminum)

or for concrete filled metal pan treads steel.

****

****

NOTE: Each tread and the top landing of a stairway where vertical risers are used should have a nose which extends 12 to 25 mm 1/2 to one inchbeyond the face of the lower riser. Large scale details of stairs and safety nosings must be included on the drawings.

****

[Aluminum] [steel], Type _____] [Plank grating, Z275 G-90] [aluminum steel pan for concrete tread.]

2.18 SECURITY GRILLES

Fabricate of channel frames with not less than two masonry anchors at each jamb and 12 mm 1/2 inch hardened steel bars spaced not over 100 mm 4 inches both ways and welded to frame. Provide 18 by 16 mesh screen and two layers of 6 mm 1/4 inch hardware cloth clamped to frame.

2.19 STEEL PLATE WAINSCOTS FOR CONCRETE OR MASONRY COLUMNS

Shop bend to radius for round columns and at right angles for square and rectangular columns with slight 6 mm 1/4 inch radius on corners, with no horizontal joints and not more than 2 vertical joints single strapped and butt welded. Thickness shall be [_____].

2.20 STEEL STAIRS

****

NOTE: Design fire escapes of the type and arrangement to conform to Fire Escape Stairs, Section 5, of NFPA 101, Code for Safety to Life and/or appropriate country laws or Eurocode.

****

****

NOTE: Consider footwear worn by personnel using grating treads and landings with openings thru the surface.

****

Provide steel stairs complete with stringers, [steel-plate treads and risers,] [metal-pan concrete-filled treads,] [grating treads,] [nonskid metallic treads,] [precast concrete treads,] landings, columns, handrails, and necessary bolts and other fastenings. Steel stairs and accessories to be [hot-dip galvanized] [shop painted].

2.20.1 Design Loads

****

NOTE: For industrial or heavy duty stairs use live load = 5 times the expected load and a concentrated

load of 2 kN 1000 lbs. For standard applications, use a live load of 500 kg per square m 100 psf and a concentrated load of 1.3 kN 300 lbs.

****

Design stairs to sustain a live load of not less than [_____] kg per square meter pounds per square foot, or a concentrated load of [_____] applied where it is most critical. Design fire stairs to conform to and/or appropriate [country laws] [Eurocode ENV 1993-1-1, ENV 1993-1-2, ENV 1993-1-3, ENV 1993-1-4, ENV 1998-1-1, ENV 1998-1-2, ENV 1998-1-3, ENV 1998-1-4, ENV 1998-2, ENV 1998-3, ENV 1998-5.

2.20.2 Materials

****

NOTE: Provide each tread, and the top landing of a stairway where vertical risers are used, with a nose which extends 12 to 25 mm 1/2 to 1 inchbeyond the face of the lower riser. Large scale details of stairs and safety nosings must be included on the drawings.

****

****

NOTE: Tread types must be selected and indicated.

****

Provide steel stairs of welded construction except that bolts may be used where welding is not practicable. Screw or screw-type connections are not permitted.

a. Structural Steel: EN 10113/1, EN 10113/2, EN 10113/3.

b. Gratings for Treads and Landings: [Plank grating; Z275 G-90 for steel; for aluminum.] [Provide gratings with nonslip nosings.]

c. Support [steel floor plate] [metal pan for concrete fill] [steel grating] on angle cleats welded to stringers or treads with integral cleats, welded or bolted to the stringer. [Provide sheet-steel landings with angle stiffeners welded on.] Close exposed ends. [Exterior stairs shall have all exposed joints formed to exclude water.]

[d. Precast Concrete treads are factory built as specified in Section 03410, "Plant-Precast Structural Concrete."]

e. Before fabrication, obtain necessary field measurements and verify drawing dimensions.

f. Clean metal surfaces free from mill scale, flake rust and rust pitting prior to shop finishing. Weld permanent connections. Finish welds flush and smooth on surfaces that will be exposed after installation.

2.21 STEEL STAIRS, CIRCULAR

Provide standard open riser design in steel, minimum of 1800 mm 6 feet in outside diameter with 12 treads to the circle. Construct centerpole from 90 mm 3 1/2 inch minimum outside diameter circular cold drawn seamless tube, in one continuous length, with cap at top and base plate having countersunk machine screws and expansion shields for fastening to concrete floor slab. [Provide nonslip nosings for gratings.] Provide railings of minimum 30 mm 1 1/4 inchstandard pipe.

2.22 STRUCTURAL STEEL DOOR FRAMES

****
NOTE: Choose one of the two options below.
****

****
NOTE: Select the applicable paragraph(s) from the following:
****

[a. Provide frames as indicated. If not otherwise shown, construct frames of structural shapes, or shape and plate composite, to form a full depth channel shape with at least 40 mm 1 1/2 inch outstanding legs. For single swing doors, provide continuous 16 by 40 mm 5/8 by 1 1/2 inch bar stock stops at head and jambs. For freight elevator hoistway entrance, include a non-skid metal sill [as indicated].

b. Where track, guides, hoods, hangers, operators, and other such accessories are required, provide support as indicated.

c. Provide jamb anchors near top, bottom, and at not more than 600 mm 24 inch intervals. Provide the bottom of each jamb member with a clip angle welded in place with two 12 mm 1/2 inchdiameter floor bolts for adjustment.

[d. Provide spreaders between bottoms of floor jamb members. When floor construction permits, they may be left in place, concealed in the floor.]]

--or--

[Provide frames of rolled shapes as indicated. Miter and weld heads to jambs, or have riveted clip angle connections concealed in the finished work. Provide frames for swinging doors with 16 by 40 mm 5/8 by 1 1/2 inch solid bar stops secured to the frame by welding or by 6 mm1/4 inch diameter countersunk machine screws spaced not more than 300 mm 12 inches on centers. Stiffen head openings greater than 900 mm 3 feet sufficient to limit deflection to not more than 2 mm1/16 inch. Secure frames to masonry with zinc-coated metal anchors spaced not more than 750 mm 30 inches on centers. Where necessary to engage the threads of machine screws for fastening hardware, back frames on inside faces with steel plates of

suitable thickness; tap frames and reinforcing plates as necessary for the installation of hardware and other work. Countersink rivets and screw heads where exposed in the finished work. Grind welds smooth.]

2.23 WHEEL GUARDS

Provide wheel guards of hollow, heavy-duty type cast iron conforming to ISO 185 with shaped, rounded top, at least 450 mm 18 inches high, and designed to provide a minimum of 150 mm 6 inches of protection.

2.24 WINDOW GUARDS, DIAMOND-MESH TYPE

****

NOTE: Select mesh size for woven wire. Include expanded metal option when 40 mm 1 1/2 inchmesh is specified. Delete remaining parenthetical portions. Specify proper portion for interior or exterior installation. Select the type of window guard which best suits job requirements.

****

Provide diamond-mesh window guards constructed of woven steel wire framed with hot-rolled or cold-formed structural steel shapes. Provide woven wire panels of 3.3 mm 10 gage, 40 mm 1 1/2 inch mesh secured through weaving bar to 25 by 12 by 3 mm one by 1/2 by 1/8 inchthick channel frame. Miter and weld corners of frames. [Mount window guards on interior of window frame with not less than two tamperproof hinged butts mounted on wood jambs with 6 mm 1/4 inch lag bolts, to masonry jamb with toggle bolts, or welded to metal jambs.] [Mount window guards on exterior of window frame with not less than two tamperproof hinged butts mounted on 25 by 12 by 3 mm one by 1/2 by 1/8 inchjamb channel attached as indicated to 50 by 6 mm 2 by 1/4 inchplate anchored to wood jamb with 6 mm 1/4 inch lag bolts; to masonry jamb with toggle bolts, or to concrete jambs and solid masonry jambs with expansion shields and bolts.] Provide one additional butt for each 900 mm 3 foot internal length of guard over 1500 mm 5 feet. Provide one tamperproof hasp and padlock, with access from the interior, for each butt used and installed on the jamb opposite to that hinged. [Provide galvanized guards and accessories.]

2.25 WINDOW GUARDS, WOVEN WIRE

Provide woven wire window guards of size necessary to completely fill opening. Construct guards with 10 mm 3/8 inch round rod frame and 40 mm 1 1/2 inch diamond-mesh of (3.4 mm)(0.135 diameter) wire; all material zinc-coated. Provide at least three hinge side clips on one side and two lock ring hasps on opposite side. [Provide galvanized guards and accessories.]

PART 3 EXECUTION

3.1 INSTALLATION

Install items at locations indicated, according to manufacturer's instructions. Items listed below require additional procedures.

3.2 ANCHORAGE, FASTENINGS, AND CONNECTIONS

Provide anchorage where necessary for fastening miscellaneous metal items securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

3.3 BUILT-IN WORK

Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

3.4 WELDING

Perform welding, welding inspection, and corrective welding, in accordance with EN 288/1, EN 288/2,EN 288/3,EN 288/4,EN 288/5,EN 288/6, and EN 288/7 use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

3.5 FINISHES

3.5.1 Dissimilar Materials

Where dissimilar metals are in contact, protect surfaces with a coat conforming to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect with asphalt-base emulsion.

3.5.2 Field Preparation

****

NOTE: Delete these paragraphs when Section 09900, "Paints and Coatings" is included in the project specifications.

****

Remove rust preventive coating just prior to field erection, using a remover approved by the rust preventive manufacturer. Surfaces, when assembled, shall be free of rust, grease, dirt and other foreign matter.

3.5.3 Environmental Conditions

Do not clean or paint surface when damp or exposed to foggy or rainy weather, when metallic surface temperature is less than -15 degrees C5 degrees F above the dew point of the surrounding air, or when surface temperature is below 7 degrees C or over 35 degrees C 45 degrees F or over 95 degrees F, unless approved by the Contracting Officer.

3.6 ACCESS PANELS

Install a removable access panel not less than 300 by 300 mm 12 by 12 inches directly below each valve, flow indicator, damper, or air splitter that is located above the ceiling, other than an acoustical ceiling, and that would otherwise not be accessible.

3.7 CONTROL-JOINT COVERS

Provide covers over control-joints and fasten on one side only with fasteners spaced to give positive contact with wall surfaces on both sides of joint throughout the entire length of cover.

3.8 COVER PLATES AND FRAMES

Install the tops of cover plates and frames flush with floor.

3.9 HANDRAILS

3.9.1 Steel Handrail

Install [in pipe sleeves embedded in concrete and filled with non-shrink grout or quick setting anchoring cement with anchorage covered with standard pipe collar pinned to post.] [by means of pipe sleeves secured to [wood with screws.] [masonry with expansion shields and bolts or toggle bolts.] [by means of base plates bolted to stringers or structural steel frame work.]] Secure rail ends by steel pipe flanges [anchored by expansion shields and bolts.] [through-bolted to a back plate or by 6 mm 1/4 inch lag bolts to studs or solid backing.]

3.9.2 Aluminum Handrail

Affix to base structure by [flanges anchored to concrete or other existing masonry by expansion shields] [base plates or flanges bolted to stringers or structural steel framework] [flanges through-bolted to a backing plate on other side of a wall] [flanges lag bolted to studs or other structural timbers]. Provide Grade B.5 stainless steel bolts to anchor aluminum alloy flanges, of a size appropriate to the standard product of the manufacturer. Where aluminum or alloy fittings or extrusions are to be in contact with dissimilar metals or concrete, give the contact surface a heavy coating of bituminous paint.

3.10 LADDERS

Secure to the adjacent construction with the clip angles attached to the stringer. [Secure to masonry or concrete with not less than two 12 mm1/2 inch diameter expansion bolts.] Install intermediate clip angles not over 1200 mm 48 inches on center. Install brackets as required for securing of ladders welded or bolted to structural steel or built into the masonry or concrete. In no case shall ends of ladders rest upon [finished roof] [floor].

3.11 STEEL STAIRS

Provide anchor bolts, grating fasteners, washers, and all parts or devices necessary for proper installation. Provide lock washers under nuts.

3.12 WHEEL GUARDS

Anchor guards to concrete or masonry in accordance with manufacturer's instructions. Fill hollow cores solid with concrete with minimum compressive strength of 17 MPa 2500 psi.

3.13 [ROOF HATCH

****
NOTE: For LANTNAVFACENGCOM, add the following paragraph.
****

Shall be of zinc-coated steel sheets not less than 1.9 mm 14 gage, with 75 mm 3 inch beaded flange, welded and ground at corner. Provide a minimum clear opening of 760 by 900 mm 30 by 36 inches. Construction and accessories shall be as follows:

a. Insulate cover and curb with 25 mm one inch thick rigid fiberboard insulation covered and protected by zinc-coated steel liner not less than 0.45 mm 26 gage. Curb shall be 300 mm 12 inches high, formed with 75 mm 3 inch mounting flange with holes provided for securing to the roof deck. Equip the curb with an integral metal cap flashing of the same gage and metal as the curb, full welded and ground at corners for weathertightness.

b. Provide hatch completely assembled with pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles on inside and outside, and neoprene draft seal. Provide fasteners for padlocking on the inside. Equip the cover with an automatic hold-open arm complete with grip handle to permit one-hand release. Cover action shall be smooth through its entire range with an operating pressure of approximately 130 N 30 pounds.]

****
NOTE: Suggestions for improvement of this specification will be welcomed using the Navy "Change Request Forms" subdirectory located in SPECSINTACT in Jobs or Masters under "Forms/Documents" directory or DD Form 1426. Suggestions should be forwarded to:

Commanding Officer
Naval Construction Battalion Center
NAVFAC 15G/CESO 158
1000 23rd Avenue
Port Hueneme, CA 93043-4301

FAX: (805) 985-6465/982-5196 or DSN 551-5196

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-- End of Section --